(OP 46) Cell Encapsulation in Thermoresponsive Chitosan Based Hydrogels for Cartilage Tissue Engineering

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The repair of articular cartilage is still a challenging medical problem and there is a need for the development of a clinically useful cartilage tissue engineering strategies. A variety of materials have been suggested for cartilage engineered repair, and injectable hydrogels are among the most promising alternatives.

This work aimed the exploration of the suitability of chitosan/glycerol-phosphate/hydroxyethyl cellulose (CGP) hydrogel as scaffold for cell encapsulation, using ATDC5 cells (murine chondrogenic cell line) to produce cartilage-like tissue trough tissue engineering approach.

A high cell density was encapsulated within the CGP hydrogel and cultured for up 28 days. The MTS and DNA assays suggest that CGP hydrogel neither altered cell viability nor proliferation in three-dimensional culture. The constructs were histologicaly characterized by H&E staining which revealed that the cells were uniformly distributed within the hydrogel, they adopted a rounded morphology, and formed characteristic lacunae around each cell in the hydrogel. Toluidine Blue and Safranin O stainings also suggest an abundant accumulation of GAG in the extracellular matrix surrounding the ATDC5 cells cultured in 3D into CGP hydrogels, after 4 weeks of culture. The results also evidence an increase in the synthesis of GAG observed by the DMB quantification assay.

The results confirm the potential of the CGP hydrogel as carrier and support for chondrocyte-like cells. CGP hydrogel induces and

supports a stable chondrocytic phenotype of ATDC5 cells *in vitro*, by promoting the expression of cartilage-specific markers and the accumulation of cartilage-specific extracellular matrix, and thus showing promising properties for cartilage regeneration.